



## Concept

According to the Department of Defense Ergonomics Working Group, “ergonomics is essentially fitting the workplace to the worker. It involves the application of knowledge about human capacities and limitations to the design of workplaces, jobs, tasks, tools, equipment, and the environment. Implementing and maintaining an effective ergonomics program at (the) facility means working smarter and safer.”

The DoD Ergonomics Working Group acknowledges that the “goals of an ergonomics program are to prevent or control injuries and illnesses by eliminating or reducing worker exposure to work-related musculoskeletal disorder risk factors, which include the following”:

- ✓ awkward postures
- ✓ repetition
- ✓ material handling
- ✓ force
- ✓ mechanical compression
- ✓ temperature extremes
- ✓ glare
- ✓ inadequate lighting
- ✓ duration

A safe and effective ergonomics program will promote a workplace that helps reduce the potential for fatigue, error or unsafe acts. The DoD Ergonomics Working Group lists other benefits of an effective ergonomics program: reduction in absenteeism and worker turnover; increased overall work productivity and quality; reduction in workers’ compensation claims and associated cost; and an improvement in military readiness.

With the challenge of Secretary of Defense Rumsfeld and the increased emphasis on work-related injuries in the workplace, it is important the US Army medical facilities provide a safe working environment. The US Army Center for Health Promotion and Preventive Medicine (CHPPM) is a recognized resource for researching and instituting an ergonomics program (<http://chppm-www.apgea.army.mil/ergopgm/ergohome.htm>). There are several links to OSHA, Department of Army policy, and the DoD Ergonomics Working Group, which give insight on establishing and implementing an effective ergonomics program.

For US facilities in Europe, there are additional ergonomics requirements that must be met to achieve a safe environment. The Council Directive 90/270/EEC of 29 May 1990 outlines the minimum safety and health requirements for work with display screen equipment. The Council Directive includes the European Union Law on Computer Workplaces, where specific minimum standards are set forth (and are contained herein this document).

## DoDI 6055.1 Instruction – Safety and Occupational Health

The DoD Instruction letter referenced above provides ergonomic program requirements and procedures for all Department of Defense installations. The entire document can be found on the US Army CHPPM website (<http://chppm-www.apgea.army.mil/ergopgm/ergohome.htm>). Of note is the following section, which is part of Enclosure 6 of the document, and outlines the responsibilities of each agency in establishing and implementing an ergonomics program at the facility level.

E6.1.3. Hazard Prevention Control. Effective design or redesign of a task or workstation is the preferred method of preventing and controlling harmful stresses. The methods of intervention (in order of priority) to be used are: process elimination, engineering controls, substitution, work practices, and administrative controls; e.g., adjustment of work-rest cycles, slowing work pace, task rotation. The Department of Defense does not recognize back support belts or wrist splints as personal protective equipment, or the use of these devices in the prevention of back or wrist injuries. These devices are considered medical appliances and may be prescribed by credentialed health care providers who are responsible for medical clearance, monitoring and proper fit. When appropriate, musculoskeletal hazards shall be assigned to a RAC (Risk Assessment Code) using the safety RAC scoring system described in Enclosure E7, and entered in to the installation hazard abatement plan.

E6.1.4. Health Care Management. Each Component shall develop and implement written guidelines for early recognition, evaluation, treatment, assignment to light or restricted duty, and follow-up for employees with work-related musculoskeletal disorders. These guidelines shall be used at the local level to develop their written health care management protocols.

E6.1.5. Education and Training. Each Component shall develop, implement, and integrate ergonomic guidelines and standards into existing SOH (Safety & Occupational Health) training programs at the local level.

E6.1.6. Program Evaluation and Review. Each Component shall be responsible for evaluating its ongoing ergonomic effort to measure the effectiveness of interventions and level of participation.

E6.1.7. Acquisition. Each Component shall consider ergonomic design criteria during procurement of weapon systems, facilities and equipment to help reduce the life-cycle costs due to ergonomic injuries.

E6.1.8. The Computer/Electronic Accommodations Program (CAP). Individuals with visual, hearing, dexterity and cognitive disabilities may be provided assistive equipment for specific work situations at no cost to the worker. CAP assists the DoD Components in their efforts to educate personnel on ergonomic hazards and to prevent musculoskeletal impairments.

## The Council Directive

The Council Directive on the minimum safety and health requirements for work with display screen equipment outlines the following criteria:

### 1. EQUIPMENT

(a) General comment - The use as such of the equipment must not be a source of risk for workers.

(b) Display screen:

The characters on the screen shall be well-defined and clearly formed, of adequate size and with adequate spacing between the characters and lines.

The image on the screen should be stable, with no flickering or other forms of instability.

The brightness and/or the contrast between the characters and the background shall be easily adjustable by the operator, and also be easily adjustable to ambient conditions.

The screen must swivel and tilt easily and freely to suit the needs of the operator.

It shall be possible to use a separate base for the screen or an adjustable table.

The screen shall be free of reflective glare and reflections liable to cause discomfort to the user.

(c) Keyboard

The keyboard shall be tiltable and separate from the screen so as to allow the worker to find a comfortable working position avoiding fatigue in the arms or hands.

The space in front of the keyboard shall be sufficient to provide support for the hands and arms of the operator.

The keyboard shall have a matt surface to avoid reflective glare.

The arrangement of the keyboard and the characteristics of the keys shall be such as to facilitate the use of the keyboard.

The symbols on the keys shall be adequately contrasted and legible from the design working position.

(d) Work desk or work surface

The work desk or work surface shall have a sufficiently large, low-reflectance surface and allow a flexible arrangement of the screen, keyboard, documents and related equipment.

The document holder shall be stable and adjustable and shall be positioned so as to minimize the need for uncomfortable head and eye movements.

There shall be adequate space for workers to find a comfortable position.

(e) Work chair

The work chair shall be stable and allow the operator easy freedom of movement and a comfortable position.

The seat shall be adjustable in height.

The seat back shall be adjustable in both height and tilt.

A footrest shall be made available to any one who wishes for one.

## 2. ENVIRONMENT

### (a) Space requirements

The workstation shall be dimensioned and designed so as to provide sufficient space for the user to change position and vary movements.

### (b) Lighting

Room lighting and/or spot lighting (work lamps) shall ensure satisfactory lighting conditions and an appropriate contrast between the screen and the background environment, taking into account the type of work and the user's vision requirements.

Possible disturbing glare and reflections on the screen or other equipment shall be prevented by coordinating workplace and workstation layout with the positioning and technical characteristics of the artificial light sources.

### (c) Reflections and glare

Workstations shall be so designed that sources of light, such as windows and other openings, transparent or translucent walls, and brightly coloured fixtures or walls cause no direct glare and, as far as possible, no reflections on the screen.

Windows shall be fitted with a suitable system of adjustable covering to attenuate the daylight that falls on the workstation.

### (d) Noise

Noise emitted by equipment belonging to workstation(s) shall be taken into account when a workstation is being equipped, in particular so as not to distract attention or disturb speech.

### (e) Heat - Equipment belonging to workstation(s) shall not produce excess heat which could cause discomfort to workers.

### (f) Radiation - All radiation with the exception of the visible part of the electromagnetic spectrum shall be reduced to negligible levels from the point of view of the protection of workers' safety and health.

### (g) Humidity - An adequate level of humidity shall be established and maintained.

**3. OPERATOR/COMPUTER INTERFACE** - In designing, selecting, commissioning and modifying software, and in designing tasks using display screen equipment, the employer shall take into account the following principles:

(a) software must be suitable for the task;

(b) software must be easy to use and, where appropriate, adaptable to the operator's level of knowledge or experience; no quantitative or qualitative checking facility may be used without the knowledge of the workers;

(c) systems must provide feedback to workers on their performance;

(d) systems must display information in a format and at a pace which are adapted to operators;

(e) the principles of software ergonomics must be applied, in particular to human data processing.

When designing employee workstations comprised of modular system product and ergonomic seating, it is recommended that the facility Safety Officer is involved in the review and sign-off of each layout. Once the product is procured and delivered, all workstations are to be installed per the layout approved by the facility Safety Officer.

## The European Union Law On Computer Workplaces

The European Union Law on Computer Workplaces (minimum standards) is as follows:

### 1.1 Monitor

- no flickering, minimum frequency 73 Hz, recommended 85 Hz
- twist and tilt possibility, casing not too light or dark (non-white or black)
- positive surface intensity 100 cd/m<sup>2</sup> IAW DIN 29241

### 1.2 Keyboard

- adjustable, separate from monitor
- clear key labeling/lettering
- key height maximum 30mm in C column
- keyboard angle less than 15°

### 1.3 Document Holder

- self supporting – tiltable between 15° and 75°
- adequate size and stability
- not to impair reading by improper placement

### 2.1 Work Surface (Table)

- if table not adjustable, 72 cm high
- if adjustable, minimum 68 to 76 cm
- ergonomic reasons may allow a lower adjustment
- work surface include keyboard will not exceed 75 cm

### 2.2 Work Surface Space (Table surface only)

- minimum space 160 x 80cm = 1,28m<sup>2</sup> by 80 cm table depth
- enlarging by 10 cm intervals if other than computer work is performed at the same table (Enlarged part should be angled – L shaped – and 60cm long, 80 cm if storage cabinet is below)

### 2.3 Work Surface Depth

- distance to monitor at least 80cm
- monitor is not allowed to protrude the table surface, space between table edge and monitor for keyboard and handrest minimum 10 cm

### 2.4 Work Surface Angle

- a tilt of 8° is ergonomically desirable, but not required

### 2.5 Table Surface

- free of glare and mirror effects
- surface should not be of a very light or dark color (not white or black)
- must be IAW DIN 4554

### 2.6 Legroom

- 69 cm high x 58 cm width x 60 cm depth
- footrest 45 cm into the legroom and maximum 10 cm protruding

### 2.7 Electric

- no sharp edges on cable conduits; traction relief on power and data cables

### 2.8 Chair

- chair with five similar supports or lockable rollers; height adjustable from 42 to 53 cm
- spring loaded IAW DIN 4551
- seat accommodation thru chair footsteps in support for small employees IAW DIN 4556
- back support 450 mm or higher above seat; adjustable to human body configuration
- chairs with synchronized adjustments are recommended

### 3.0 Workplace Surrounding/Space

- free space in front of all furniture and equipment 80 cm
- 1 m depth/distance to a wall, partition, or other room construction
- minimum free movement area = 1,5 m<sup>2</sup>
- storage or general walking area and floor areas are not included IAW DIN 4543-1

### 3.1 Colors

- ceiling reflection degree 0,7- 0,85
- wall reflection degree 0,5- 0,65
- floor reflection degree 0,2- 0,4
- dull or semi-dull reflection degrees 0,2 – 0,5

### 3.2 Glare

- no reflection from shiny surfaces, lamps or other light sources
- all windows with adjustable shades

### 3.3 Climate

- recommended office temperature 20-22°C
- during extreme outside temperatures not below 18° or above 26°C
- air velocity 0,1 – 0,15 m/sec
- humidity 30-60%, recommended 50%

### 3.4 Light

- horizontal light flow at work area 500 lux

### 3.5 Noise

- machinery must have a low noise level or be equipped with noise reduction techniques
- ambient noise will not disturb conversation or reduce concentration
- maximum noise level 55dB (A)

## Conclusion

The US Army and the European community is very serious about providing a safe and hazard-free workzone for their respective personnel. The standards and guidelines included in this section are minimum requirements to ensure the well-being and work efficiency of the general staff. For more information, contact the European Regional Medical Command Safety Office.